Descloiseaux announced in his "Manuel de Mineralogie," tephroite and chrysolite are isomorphous.

Pyrosmalite. — Alex. Gorgen[1] communicates an analysis of pyrosmalite from Dannemora which is of considerable interest in that it shows a close analogy in composition with a silicate of manganese from Adervielle, Hautes Pyrenees, described by Bertrand under the name of Friedelite.

The oxygen ratios of the two minerals are as follows:

	SiO_2	MnO FeO CaO MgO	Cl Fe	H_2O
Pyrosmalite	18.24	11.56	0.84	7.60
Friedelite	18.37	11.42	0.80	8.53

Both minerals are remarkable for the energy with which they retain their chlorine and water. Both are hydrated chlorosilicates, and present chemically the same analogy as Bertrand has shown to exist between their crystalline form and their optical properties.

HAYDENITE.—H. N. Morse and W. S. Bayley[2] have reëxamined the variety of chabazite known as haydenite, found in the gneiss quarries near Baltimore. Cleaveland named the species in 1822, but its independence as a separate species was doubted until Levy, in 1839, showed it to be, as he supposed, monoclinic. But Dana afterwards showed Levy to be in error, demonstrating that the mineral was rhombohedral, occurring in scalenohedrons. He held that haydenite and chabazite were identical, although the analyses of the two minerals, yet made, differed. The analysis of Silliman and Delesse differed from one another and from chabazite.

The composition, as now ascertained, is (mean of two analyses):

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	BaO	K_2O	H_2O	
49.24	18.07	0.84	5.16	0.86	1.47	3.00	21.31	= 99.95

By regarding the iron as in the ferrous condition and, like magnesium and barium, replacing calcium, the analysis closely agrees with the recorded analysis of chabazite and with Rammelsberg's formula for that mineral. Haydenite is thus undoubtedly in all respects identical with chabazite.

BOTANY.[3]

AN OBSERVATION OF THE FERTILIZATION OF THE GERM CELL OF EQUISETUM ARVENSE.—The spores were started on the 30th of April. For some reason, for a time growth did not seem healthy, and they were neglected until the last of June, when I found that they had developed large prothallia, both male and female, the latter

[1] Bull. Soc. Min. de France, 1884, p. 58.

[2] *Amer. Chem. Journal*, March, 1884.

[3] Edited by PROF. C. E. BESSEY, Ames, Iowa.

much larger, and with longer and more forking branches. Young plants were first noticed June 30th, exactly two months from the time of sowing the spores.

On examining the prothallia, numbers of fresh archegonia were found at the base of the branchse, the germ cell being imbedded in the tissue of the prothallium.

On the third of July, I was fortunate enough to witness the entrance of the antherozoids into the archegonium.

Finding an archegonium that from its appearance was evidently on the point of opening, a portion of a male-prothallium, containing a ripe antheridium was placed upon the same slide.

For some time before opening, the four upper cells of the archegonium became much distended with water (Fig. 1) so as to present a somewhat bulbous appearance. These four cells gradually separate until finally they diverge widely. This open-

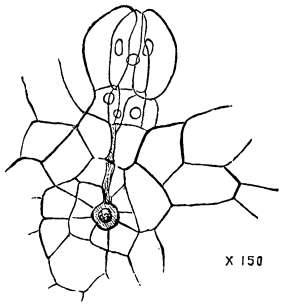

FIG. 1.

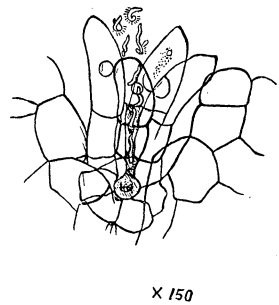

FIG. 2.

ing is accompanied by the discharge of a considerable quantity of transparent mucilage that collects in drops near the opening.

Within a few moments after the archegonium opened, an antherozoid made its way to the opening, and penetrated a short distance, but for some reason did not remain. Very soon, however, a large number collected around the mouth of the archegonium, soon one penetrated far down, followed by several others. The entrance was effected by a peculiar sinuous or spiral movement, but on account of the large size of the antherozoids, but one could pass down at a time, the diameter of the neck of the archegonium being small (Fig. 2).

The germ-cell, being buried in the tissue of the prothallium, prevented my seeing clearly the union of the antherozoids with it.—*D. H. Campbell, 91 Alfred street, Detroit, Mich.*

SISYRINCHIUM BERMUDIANA.—The following paper appeared in the April number of the London *Journal of Botany*, and is of such interest to botanists in this country that we reprint it entire:

"On first seeing the specimens of Sisyrinchium collected in the Bermudas, by Sir J. H. Lefroy and Mr. Mosely, I suspected that they were specifically different from the plant commonly

known as *Sisyrinchium bermudiana*, and after comparing them with numerous specimens of the plant so called from eastern North America, I was convinced that such was the case. Referring to the literature of the subject, I found this view supported by all the early writers who had actually seen the Bermudan plant. The history of the two species concerned is soon told. Towards the end of the seventeenth century Plukenet figured and briefly described what he termed the Bermudan and the Virginian Sisyrynchii, the types of which are still preserved in the Sloane Herbarium at the British Museum. Dillenius, who had opportunities of seeing living plants at Eltham, followed Plukenet in distinguishing these two species, and published better figures and more complete descriptions of them in the 'Hortus Elthamensis.' Linnaeus, who we assume did not see the Bermudan plant, as there is no specimen in his herbarium, united the two, as varieties of one, under the name of *S. bermudiana*. Miller, who seems to have been the most accomplished English botanist of his day, was the first to restore the two forms to specific rank. This was in 1771. In 1789 Curtis figured the true Bermudan plant and insisted upon its specific rank, remarking that he had living plants before him of both the species figured by Dillenius. Unfortunately he gave it a new specific name, for which he afterwards expressed his regret. The first DeCandolle wrote the text to the excellent figure of the Bermudan plant, which was published in Redouté's 'Liliacées,' at the beginning of the present century, and he particularly points out its distinctive characters. I have not taken the trouble to turn up every book in which the two species are likely to be mentioned, and I have not ascertained who was the first botanist to reunite them; but the North American botanists seem to be agreed that there is only one species of Sisyrinchium in the Eastern States, and this they designate *S. bermudiana*. The error probably arose in consequence of the Bermudan plant disappearing from European gardens, though the name was retained. *S. bermudiana* requires the shelter of a greenhouse in this country, not merely to protect it from frost, but also to enable it to attain its full development, while *S. angustifolium*, the other species, is perfectly hardy and grows like grass. Curtis, having been deceived by its behavior during a very mild winter, at first stated that the Bermudan plant was hardy, an assertion that he recalled in the letter-press accompanying the figure cited below of his *S. gramineum*."

The synonymy of the Bermudan plant follows:—

SISYRINCHIUM BERMUDIANA Linn. Sp. Pl., ed. 1. p. 954 (quoad β tantum); Miller, Dict., ed. 6; Lamarck Encycl. Method. Bot. i., p. 408; Redouté, Lil. t. 149.

Sisyrinchium *bermudense* floribus parvis, ex cæruleo & aureo mixtis; Iris Phalangoides quorundam; Plukenet, Amagestum, p. 348, et Phytogr., t. 61, fig. 2.

Bermudiana Iridis folio, fibrosâ radice, Tournefort, Inst. Rei Herb., p. 388, t. 108; Dillenius, Hort. Elth., p, 48, t. 41, fig. 48.

Sisyrinchium iridioides Curtis, Bot. Mag., t. 94.

Sisyrinchium bermudianum, var. 1, Baker in Journ. Linn. Soc. Lond., xvi., p. 117.

Endemic in the Bermudas.

Besides the Bermudan specimens alluded to above, there are cultivated specimens at Kew from the herbarium of Bishop Goodenough, presented by the corporation of Carlisle.

Sisyrinchium bermudiana differs from *S. angustifolium* in being much larger in all its parts, and strikingly so in its broad leaves, which are equitant at the base; hence Curtis's name *iridioides*. It grows eighteen to twenty-four inches high, and is stout in proportion. The flowers are large, and the broad segments of the perianth are obovate-mucronate; but I have not been able to compare the flowers, as there are none of the Bermudan species in a satisfactory state. However, a comparison of the figures cited should be sufficient to convince anyone of their specific diversity.

With regard to the forms of Sisyrinchium from eastern North America, if they are all to be regarded as belonging to one species, and we have the authority of the leading botanists in the States for considering them as such, Miller's name, being the earliest, is the one to adopt.

SISYRINCHIUM ANGUSTIFOLIUM Miller, Dict., ed. 6 (1771).

Sisyrinchium anceps Cavanilles, Dissert. vi, p. 345 t. 190, fig. 2 (1788).

Sisyrinchium gramineum Curtis, Bot. Mag., t. 464 (1799).

Sisyrinchium mucronatum Michaux, Fl. Bor.-Am. ii, p. 33 (1803).

Sisyrinchium bermudiana Linn., Sp. Pl., ed. i, p. 954 excl, *β. bermudense.*

Sisyrinchium bermudiana, A. Gray Man. Bot. Northern U. S., ed. 5, p. 517; Chapman, Fl. Southern U. S., p. 474; Baker in Jour. Linn. Soc. Lond., xvi, p. 117, excl. var. 1.

Sisyrinchium cæruleum parvum gladiato caule *Virginianum*: Plukenet, Almagestum, p. 348, et Phytogr., t. 61, fig. 1.

Bermudiana graminea, flore minore cæruleo: Dillenius, Hort. Elth., p. 49, t. 41, fig. 49,

Common in the Eastern States of North America, from Massachusetts to Florida, and naturalized in the Mauritius, New Zealand, and Australia. It also occurs in Ireland, where it is reported to be spreading; and as it so readily colonizes, it has been considered as an introduced plant, though, on the other hand, the North American *Eriocaulon septangulare* is generally admitted to be indigenous in Ireland. Since the above has been in type, Dr. Asa Gray has directed my attention to the fact that Mr. Sereno Watson pointed out, as long ago as 1877 (Proc. Am. Acad. Sc., xii, p. 277), that the Bermudan Sisyrinchium was a distinct species; but as he has neither elaborated the synonymy of the species, nor explained that the Linnean *S. bermudiana* was a composite one, he has only so far anticipated me that he recognized the Bermudan plant as different from the North American.—*W. B. Hemsley.*

BAILEY'S CATALOGUE OF N. A. CARICES.—This compilation is an attempt at a complete catalogue of the North American species of Carex. It includes two hundred and ninety-three species and eighty-four varieties. It contains the latest authentic nomenclature, besides a number of reductions by the author as a result of his personal studies in the Harvard University Herbarium. For convenience of reference, the arrangement is alphabetical, and in every case the general distribution is briefly given.

In comparing it with the latest edition of Gray's Manual, the more important changes which we note are the following:

C. stellulata (No. 36 Manual)	=	*C. echinata* Murr.
C. fœnea (No. 43 Manual)	=	*C. straminea* Schk., var *chlorostachys.*
C. limula (No. 47ª Manual)	=	*C. vulgaris* Fries., var. *hyperborea.*
C. stricta (No. 51 Manual)	=	*C. angustata* Boott.
C. gynandra (No. 56 Manual)	=	*C. crinita* Lam., var. *gynandra.*
C. lanuginosa (No. 117 Manual)	=	*C. filiformis* L. var. *latifolia.*
C. paludosa (No. 123 Manual)	=	*C. acutiformis* Ehrh.
C. comosa (No. 126 Manual)	=	*C. pseudo-cyperus* L., var. *comosa.*
C. lupuliformis (No. 133 Manual)	=	*C. lupulina* Muhl., var. *polystachya.*
C. olneyi (No. 145 Manual)	=	*C. bullata* Schk.
C. rotundata (No. 149 Manual)	=	*C. miliaris* Mx.
C. pulla (No. 150 Manual)	=	*C. saxatilis* L.

C. pauciflora of the Manual (No. 4) is omitted from this catalogue.

Exchanges (and notes) in Carex, especially Western species, are solicited by the author. Copies of the catalogue may be obtained for five cents each, or in exchange for desiderata by addressing L. H. Bailey Jr., Botanic Gardens, Cambridge, Mass.

GRANT ALLEN'S COLORS OF FLOWERS.—The house of Macmillan & Co. has brought out in neat form a suggestive little book by Grant Allen, bearing the title of "The Colors of Flowers as illustrated in the British Flora." The book is an expansion of an article originally published in the *Cornhill Magazine*, and so is adapted to the wants andcapacities of the general reader. The general style of the book may be judged from the following paragraph from the introductory chapter:

"The flowers that most people observe and recognize as such, are the few highly developed forms which possess large expanded colored surfaces to allure the eyes of their insect fertilizers. It is with flowers in this more popular and ordinary sense that we shall have to deal mainly in the present little treatise; and our object must be to determine, not why they are all as a group brightly colored, but why this, that, or the other particular blossom should possess this, that, or the other particular hue. Why is the buttercup yellow, while the stitchwort is white, the dog-rose pink, and the harebell blue? Why is the purple fox-glove dappled inside with lurid red spots? Why are the central florets of the daisy yellow, while the ray florets are pinky-white? Why does sky-blue

prevail among all the veronicas, while yellow predominates in the St. Johnsworts, and white in the umbellates? These are the sort of questions which we must endeavor briefly to answer by the light of modern evolutionary biology, from the point of view of the function which each color specially subserves in the economy of the particular plant which displays it."

We should like to quote more from this fascinating little book, but enough has been given to make every reader wish to possess and read the whole book for himself.

FLOWERS AND THEIR PEDIGREES.—Much like the foregoing in the mode of treatment is the somewhat larger book, "Flowers and their Pedigrees," by the same author, and brought out in this country by the New York house of Appleton & Co. The chapters take up successively the daisy's pedigree; the romance of a wayside weed; strawberries; cleavers; the origin of wheat; a mountain tulip; a family history [the order Rosaceæ]; the cuckoo-pint.

In the family history the author says: "The method of our inquiry must be a strictly genealogical one. For example, if we ask at the present day whence came our own eatable garden plums, competent botanists will tell us that they are a highly cultivated and carefully selected variety of the common sloe or blackthorn. It is true, the sloe is a small, sour, and almost uneatable fruit, the bush on which it grows is short and trunkless, and its branches are thickly covered with very sharp, stout thorns; whereas the cultivated plum is borne upon a shapely spreading tree, with no thorns, and a well marked trunk, while the fruit itself is much larger, sweeter and more brightly colored than the ancestral sloe. But these changes have easily been produced by long tillage and constant selection of the best fruiters through many ages of human agriculture. * * * * *

"Now, if we push our inquiry a step further back, we shall find that this which is true of cultivated plants in their descent from wild parent stocks, is true also of the parent stocks themselves in their descent from an earlier common ancestor. Each of them has been produced by the selective action of nature, which has favored certain individuals in the struggle for existence at the expense of others, and has thus finally resulted in the establishment of new species having peculiar points of advantage of their own, now wholly distinct from the original species whose descendants they are. Looked at in this manner, every family of plants or animals becomes a sort of puzzle for our ingenuity, as we can to some extent reconstruct the family genealogy by noting in what points the various members resemble one another, and in what points they differ among themselves. To discover the relationship of the various English members of the rose tribe to each other—their varying degrees of cousinship, or of remoter com-

munity of descent—is the object which we set before ourselves in the present paper."

The book may profitably be read by all classes of intelligent people, not excepting the scientific botanists, who at least may learn from it how to write science in simple English for non-technical readers.

NORTH AMERICAN FUNGI.—Mr. Ellis delivered the 12th and 13th centuries of his now well known North American Fungi to his subscribers about the middle of April. We have repeatedly commended the successive centuries as they have appeared, and need only say that there is no sign of a falling off in their value. A notable feature of these centuries is the collection of Slime Moulds (Myxomycetes) which will be welcomed by many students.

THE FLORA OF BUFFALO.—The Buffalo Society of Natural Sciences has done a good work in issuing a catalogue of the native and naturalized plants of the city and its vicinity, compiled by David F. Day. It enumerates and gives localities for upwards of 2739 species and varieties, all of which have been detected within a radius of fifty miles. These are distributed as follows: phanerogams 1217; vascular cryptogams 53; mosses 165; liverworts 24; lichens 204; fungi 869; algæ 207.

ENSILAGE MOULD.—Attention has been called, in England, to the various moulds found on Ensilage. In a late number of the *Gardeners' Chronicle*, Greenwood Pim describes a form which appears to have puzzled some of the British mycologists. It seems to us, from the rude drawings given, to bear considerable resemblance to the Herbarium Mould (*Eurotium herbariorum*), and indeed, it may be simply an abnormal form of that or an allied species. The great heat, in connection with the great moisture of such a mass of decaying vegetable matter, may have modified the growth, as will readily be understood by those who have attempted various cultures of moulds.

However this may be, a suggestion made by Mr. Pim is well worth the attention of our collectors. "It seems not unlikely," says he, "that vegetable matters preserved in silos may yield us some new and interesting forms of fungi, the conditions under which the fodder has been placed, being so entirely different from usual."

A PARASITIC CUP-FUNGUS.—The habit of life of the Cup-Fungi of the genus Peziza is such, that we scarcely think of them as assuming the rôle of parasites. However, if we may credit a recent note by W. G. Smith, in the *Gardeners' Chronicle*, the abundant growth of the mycelium of *Peziza postuma* on heavily manured land became injurious to potatoes. The mycel-

ium completely exhausted all the moisture from the living stems, and reduced them to tinder, afterwards forming black masses of compacted hyphæ within the old stems. The trouble is said to have occurred last autumn in many parts of Ireland.

RED CLOVER IN NEW ZEALAND.—We have all heard much said about red clover and humble-bees, and of the non-production of seed by the clover in New Zealand, where humble-bees are not found. It is interesting to read the testimony of Mr. J. B. Armstrong, of the Christ Church Botanic Garden, New Zealand. After an extended discussion of the subject, he says in conclusion, "I think that we may safely assume, that the following facts, in connection with the fertilization of red clover in New Zealand are proved: 1. That no clover does produce its seeds in this colony. 2. That some varieties are much more fertile than others. 3. That there is every reason to believe, that numerous individuals belonging to the species are self-fertile, and that they produce self-fertile progeny. 4. That all the varieties show a tendency to produce pale-colored flowers. 5. That the common hive-bee, and its variety, the so-called hybrid Ligurian bee, frequently gather honey from the blossoms of the red clover, thereby, no doubt, aiding cross-fertilization. There is also reason to believe that the red clover is becoming modified in its structure, so as to admit the visits of insects not known to visit it in England, and that such modification tends to render the plant self-fertilizing, but at the same time enables it to be improved in constitutional vigor by occasional inter-crossing."—*Gard. Chron., Nov. 17, 1883.*

BOTANICAL NOTES.—Dr. Vasey's report as botanist to the Department of Agriculture, as published in the report for 1883, is devoted to the grasses, of which twenty-five species are figured. It is one of the most valuable portions of the report.——A recent paper by Dr. J. T. Rothrock, in the *Am. Journal of Pharmacy* (Laboratory Contributions from the course preparatory to medicine in the University of Pennsylvania), indicates that in at least one medical school in this country there is an excellent botanical course.——The Houghton Farm Bulletin, No. 3 (series iii), just received, contains Professor Penhallow's record of orchard observations and experiments, which have a botanical as well as horticultural interest.——The catalogue of the North Carolina Exhibit at Boston [1883] contains under the head of botany and forestry a list of logs, discs and planks which were exhibited to illustrate the forest flora of the State. Among them we note especially a holly (*Ilex opaca*), 33 inches in diameter; service-berry (*Amelanchier canadensis*), 14½ inches in diameter; persimmon 24 inches in diameter, and a red mulberry (*Morus rubra*), 25 inches in diameter.——Botanists will find many rare books advertised, for sale at reasonable rates, in a catalogue of botanical works just issued by Dulau & Co., 37 Soho Square, W. London, Eng.